

Amendment To The Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claim 1 (currently amended) Apparatus for detecting particles on a surface of a semiconductor wafer, said surface having repetitive patterns, the apparatus comprising:

(a) ~~a~~: a laser for illuminating an area on said surface with a beam of polarized light,

(b) ~~b~~: a first camera,

(c) ~~c~~: a first imaging lens for collecting light scattered from said area, said first imaging lens forming a Fourier diffraction pattern of light scattered from said area illuminated,

(d) ~~d~~: a Fourier mask for blocking light in said Fourier diffraction pattern where the intensity is above a predetermined level indicative of background information and leaving in areas where the intensity is below said predetermined level indicative of particle information, the Fourier mask including a spatial light modulator (SLM) which is optically addressable and a polarization discriminator in the form of a polarizing beamsplitter,

(e) ~~e~~: a second camera,

(f) ~~f~~: a second imaging lens for imaging the Fourier diffraction pattern formed by the first imaging lens into the second camera, said second camera converting the image of the Fourier diffraction patterns into a stream of digital electrical signals,

~~(g) g-~~ a processor for processing the stream of digital electrical signals formed by the second camera,

~~(h) h-~~ a liquid crystal display (LCD) for converting the output of the processor into a video image, and

~~(i) i-~~ a third imaging lens for imaging the video image of the LCD onto the SLM,

~~(j) j-~~ said first camera recording the image of the area imaged by said first imaging lens using scattered light not blocked by said Fourier mask.

Claims 2-3 (canceled).

Claim 4 (previously presented) The apparatus of claim 1, wherein said laser produces a plane polarized beam of light.

Claim 5 (original) The apparatus of claim 4, wherein said SLM includes a 100% reflective mirror.

Claim 6 (original) The apparatus of claim 5, wherein said 100% reflective mirror is a dielectric mirror.

Claim 7 (original) The apparatus of claim 6, wherein said SLM further includes a liquid crystal layer.

Claim 8 (original) The apparatus of claim 7, wherein said SLM further includes a photoconductor layer.

Claim 9 (original) The apparatus of claim 8, wherein said first camera is a CCD camera.

Claim 10 (original) The apparatus of claim 8, wherein said second camera is a CCD camera.

Claim 11 (canceled).

Claim 12 (currently amended) Apparatus for detecting particles on a surface of a semiconductor wafer, said surface having repetitive patterns, the apparatus comprising:

- (a) ~~a~~: a laser for illuminating an area on said surface with a beam of polarized light,
- (b) ~~b~~: a first camera,
- (c) ~~c~~: a first imaging lens for collecting light scattered from said area, said first imaging lens forming a Fourier diffraction pattern of light scattered from said area illuminated,
- (d) ~~d~~: a Fourier mask for blocking light in said Fourier diffraction pattern where the intensity is above a predetermined level indicative of background information and leaving in areas where the intensity is below said predetermined level indicative of particle information, the Fourier mask including a spatial light modulator (SLM) which is electrically addressable and operating in a transmission mode and a polarization discriminator,
- (e) ~~e~~: a second camera,
- (f) ~~f~~: a second imaging lens for imaging the Fourier diffraction pattern formed by the first imaging lens into the second camera, said second camera converting the image into a stream of digital electrical signals,
- (g) ~~g~~: a processor for processing the stream of digital electrical signals formed by the second camera, and
- (h) ~~h~~: an SLM controller for applying the output of the processor into the SLM,

(i) i. said first camera recording an image of the area illuminated by said first imaging lens and not blocked by said Fourier mask.

Claim 13 (previously presented) Apparatus for detecting particles on a surface of a semiconductor wafer, said surface having repetitive patterns, the apparatus comprising:

- (a) a laser for illuminating an area on said surface with a beam of plane polarized light,
- (b) a first camera,
- (c) a first imaging lens for collecting light scattered from the area, said first lens forming in its back focal plane a Fourier transformation of the image in the Fourier plane of the first lens,
- (d) a second camera for receiving an image of the Fourier transformation and producing a stream of digital electrical signals of the image received,
- (e) a processor for processing the electrical image produced by the second camera,
- (f) a Fourier mask disposed in front of the first camera, the Fourier mask including an electrically addressable SLM operating in a reflective mode and a crossed polarizer, and
- (g) a controller for receiving information from the processor and applying voltage signals to the SLM in response to such information received from the processor,
- (h) said first camera receiving an image of the area illuminated by the first imaging lens and not blocked by the Fourier mask.

Claims 14-15 (canceled).

Claim 16 (previously presented) A method for detecting particles on a surface of a semiconductor wafer, said surface having repetitive patterns, the method comprising:

- (a) illuminating an area on said surface with a beam of polarized light,
- (b) collecting light scattered from said area using a first imaging lens, said first imaging lens forming a Fourier diffraction pattern of said light collected,
- (c) removing from said Fourier diffraction pattern light whose intensity is above a predetermined level indicative of background information and leaving in areas whose intensity is below said threshold level indicative of particle information using a Fourier imaging camera, a processor, a spatial light modulator which is electrically addressable and a polarization discriminator in the form of a crossed polarizer, and
- (d) recording an image of the area imaged using scattered light not removed by said Fourier mask.

Claim 17 (previously presented) The apparatus of claim 12 and further including a third camera for forming an image of the diffraction pattern in the Fourier plane.

Claim 18 (previously presented) The apparatus of claim 13 and further including a third camera for forming an image of the diffraction pattern in the Fourier plane.

Claim 19 (new) Apparatus for detecting particles on a surface of a semiconductor, said surface having repetitive patterns, the apparatus comprising:

- (a) a laser for illuminating an area on said surface with a beam of polarized light,
- (b) a first imaging lens for collecting light scattered from said area, said first imaging lens forming a Fourier diffraction pattern of light scattered from the area at the back focal plane of the first imaging lens,

(c) a beamsplitter for splitting the light collected by the first imaging lens into a transmitted beam and a reflected beam,

(d) a first camera disposed along the path of the transmitted beam at the image plane of the first imaging lens,

(e) a Fourier mask disposed between the beamsplitter and the first camera, the Fourier mask including a spatial light modulator (SLM) operating in a transmission mode and a polarization discriminator, said SLM being disposed in the Fourier transform plane of the first imaging lens, said Fourier mask blocking off light in said diffraction pattern where the intensity is above a predetermined level indicative of background information and leaving in areas where the intensity is below said predetermined level indicative of particle information,

(f) a second camera disposed along the path of reflected beam at the back focal plane of the first imaging lens for converting an image of the diffraction pattern formed by the first imaging lens using light from the reflected beam into a stream of digital electrical signals,

(g) a processor for processing the stream of digital electrical signals formed by the second camera, and

(h) an SLM controller for applying the output of the processor into the SLM,

(i) said first camera recording an image of the area illuminated by said first imaging lens and not blocked by said Fourier mask.

Claim 20 (new) Apparatus for detecting particles on a surface of a semiconductor, said surface having repetitive patterns, the apparatus comprising:

(a) a laser for illuminating an area on said surface with a beam of polarized light,

(b) a first imaging lens for collecting light scattered from said area, said first imaging lens forming a Fourier diffraction pattern of light scattered from the area at the back focal plane of the first imaging lens,

(c) a beamsplitter for splitting the light collected by the first imaging lens into a transmitted beam and a reflected beam,

(d) a first camera disposed along the path of the transmitted beam at the image plane of the first imaging lens,

(e) a Fourier mask disposed between the beamsplitter and the first camera, the Fourier mask including a spatial light modulator (SLM) operating in a reflective mode and a polarization discriminator, said SLM being disposed in the Fourier transform plane of the first imaging lens, said Fourier mask blocking off light in said diffraction pattern where the intensity is above a predetermined level indicative of background information and leaving reflecting light in areas back to said beamsplitter where the intensity is below said predetermined level indicative of particle information,

(f) a second camera disposed along the back focal plane of the first imaging lens for converting an image of the diffraction pattern formed by the first imaging lens using light reflected beam into a stream of digital electrical signals,

(g) a processor for processing the stream of digital electrical signals formed by the second camera, and

(h) an SLM controller for applying the output of the processor into the SLM,

(i) said first camera recording an image of the area illuminated by said first imaging lens and not blocked by said Fourier mask.

Claim 21 (new) Apparatus for detecting particles on a surface of a semiconductor, said surface having repetitive patterns, the apparatus comprising:

- (a) a light source for illuminating said surface,
- (b) a first digital camera,
- (c) a first lens,
- (d) a second lens,
- (e) a third lens,
- (f) a first beamsplitter,
- (g) a second beamsplitter,
- (h) a Fourier mask having an electrically addressable SLM and a crossed polarizer,
- (i) a sixth lens,
- (j) a seventh lens,
- (k) a second camera,
- (l) a third camera,
- (m) a processor,
- (n) a controller,
- (o) said sixth lens in combination with said second lens imaging a Fourier diffraction formed in Fourier plane of said first lens into said first camera,

(p) the processor processing the output of the first camera and feeding the processed output to said controller and feeding said output to said SLM,

(q) said first lens in combination with said third lens imaging the Fourier diffraction pattern onto the SLM,

(r) said first lens in combination with said second lens imaging the area illuminated by said light source at an image plane,

(s) said third lens collecting the image formed at the image plane and passing said image through said Fourier mask,

(t) the image passed by the Fourier mask is brought to focus at the first camera, and

(u) the diffraction pattern at the back focal plane of the first lens and passed through the Fourier mask is imaged at the third camera.

Claim 22 (new) Apparatus for detecting particles on a surface of a semiconductor, said surface having repetitive patterns, the apparatus comprising:

(a) a light source for illuminating said surface,

(b) a first digital camera,

(c) a first lens,

(d) a second lens,

(e) a third lens,

(f) a first beamsplitter,

(g) a second beamsplitter,

(h) a Fourier mask having an electrically addressable SLM and a crossed polarizer,

- (i) a sixth lens,
- (j) a seventh lens,
- (k) a second camera,
- (l) a third camera,
- (m) a processor,
- (n) a controller,
- (o) a fourth lens,
- (p) a third beamsplitter,
- (q) a fifth lens,

(r) said fifth lens in combination with said second lens imaging a Fourier diffraction formed in Fourier plane of said first lens into said first camera,

(s) the processor processing the output of the first camera and feeding the processed output to said controller and feeding said output to said SLM,

(t) said second lens in combination with said third lens imaging the Fourier diffraction pattern onto the SLM,

(u) said first lens in combination with said second lens imaging the area illuminated by said light source at an image plane,

(v) said third lens collecting the image formed at the image plane and collected by said third lens strikes the SLM through the second beamsplitter, and

(w) the image reflected off the SLM in the Fourier mask passed by the Fourier mask through the crossed polarizer is imaged onto the first camera, and passed through the liquid crystal plane in the SLM is imaged by the fourth lens onto the third camera after it is reflected by the second beamsplitter, passed through the crossed polarizer and reflected by the third beamsplitter.